

1st Quarter 2007 Progress Report

Reporting Period: January 1, 2007 – March 31, 2007

Experimental Assessment of Aggregate Surfacing Materials

MDT Project No. 8117-30, MSU Project No. 4W0839

Submitted by:

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Task 1: Project Management/Administration

Project activities during the first year of the project were summarized in three quarterly progress reports submitted in 2006. This report summarizes project activities during the 1st quarter of 2007 (January 1 through March 31).

During this period, Dr. Mokwa and Mr. Cuelho oversaw the various tasks associated with the project through frequent meetings with one another and the project graduate research assistant (Nick Trimble).

Task 2: Laboratory Testing

As discussed below, laboratory testing continued on the following three standard aggregate types:

1. CBC Type A Grade 5 – designated in this project as CBC 5A-1 through CBC 5A-3,
2. CBC Type A Grade 6 – designated in this project as: CBC 6A-1 through CBC 6A-6, and
3. CTS Type A Grade 2 – designated in this project as CTS 2A-1 through CTS 2A-5.

Working in conjunction with personnel from the MDT Materials Department, requests were sent to MDT District offices to obtain the relatively large aggregate samples (400 to 500 lb each) that are necessary to conduct the lab tests. We greatly appreciate the assistance provided by MDT personnel in obtaining and delivering these samples. The updated sample distribution plan is as follows:

- 6 – CBC 6A samples,
- 3 – CBC 5A samples, and
- 5 – CTS 2A samples.

Based on the revised test plan, we have now received all of the 14 sample types necessary to complete the testing program, as shown in Table 1. Table 1 includes a summary of the sample origins, designations, locations and other relevant information that was included on the data sheets transmitted with the samples.

Table 2 summarizes the laboratory testing program and shows the quantity of tests completed as of March 31, 2007. The proposed laboratory testing program was completed this quarter. Additional laboratory tests were also conducted as part of Nick Trimble's research project for WTI, which included:

- setting up and testing the CT scanner to refine scanning parameters to achieve high quality scans,
- fabricating soil containers for the CT scanner, and

- developing a standard method of compacting the soil within these containers.

A literature search is underway to document accepted uses and practices of CT scanning soil samples. For example, for every scanning apparatus there are several trade-offs that need to be balanced, including: x-ray image resolution, scanning efficiency, maximum particle size, and sample container size. It has been determined that 3-inch inside diameter samples will be scanned with a maximum particle size of 0.75 inches for all samples in this study. This will require scalping of some of the larger aggregate particles; particularly, the CBC-5A and CBC-6A samples.

Note: The x-ray CT scanning analyses constitute additional work that Nick Trimble is conducting as part of his MS thesis research. This interesting and potentially useful nondestructive study of the three aggregate types is extraneous to our proposed scope of work. The results of the x-ray CT scanning study will not be included in the final report because of the upcoming report submittal deadlines. However, we would be happy to provide the Department with a copy of the thesis chapter that summarizes this research, which should be completed by mid summer. The CT work is being funded through a fellowship from the Western Transportation Institute.

Action Items for Next Quarter:

- * Complete x-ray CT testing.

Task 3: Analyze and Synthesize Results

Data for the entire suite of laboratory tests, except for permeability and x-ray CT testing, have been analyzed and synthesized. A draft report of results has been written for the completed tests. Next quarter, priority will be given to completing the write up of the permeability testing and finalizing the research report.

Action Items for Next Quarter:

- * Complete data analysis and write up of permeability tests
- * Complete final report

Task 4: Report

Quarterly Progress Reports

Action Items for Next Quarter:

- * The final draft research report is scheduled for submission during the 2nd quarter of 2007 (next quarter). We expect to meet this schedule; consequently, we anticipate this document constitutes the last quarterly report for the project.

Final Report

A draft final report has been completed for the results and analysis of the grain size distribution, specific gravity, compaction characteristics (Proctor and relative density), direct shear, and R-value sections of the paper. During the next quarter, the permeability testing section will be drafted and the report will be finalized. We anticipate the final draft report will be completed and submitted to the Department on or before May 4, 2007.

TABLE 1. Sample Descriptions

Aggregate Type	MDT District	Borrow Name or Owner	Nearest Town	County	Section Location	*Approx. Amount	Date Received	Comments
CBC 6A-1	Great Falls	John Haynes	Great Falls	Pondera	S½: S3-T28N-R7W	8 bags	2/14/06	
CBC 6A-2	Billings	Empire S&G (Wilson Pit)	Billings	Yellowstone	E½: S6-T1N-R27E	8 bags	2/14/06	
CBC 6A-3	Glendive	BLM	Miles City	Dawson	NW¼, SE¼: S9-T15N-R48E	8 bags	2/14/06	North of Terry, MT
CBC 6A-4	Missoula	Richardson, Collin	Thompson Falls	Sanders	Tract 6&7: S14-T21N-R29W	6 bags	2/14/06	Weeksville-West
CBC 6A-5	Butte	Neil Hazel	Toston	Broadwater	SW¼: S23-T5N-R2E	8 bags	3/15/06	US 287 So. of Toston. Project # NH8-4(41)93
CBC 6A-6	Kalispell	Sandon Const.	Kalispell	Flathead	SW1/4: S36-T30N-R21W	8 bags	2/14/06	Commercial source
CBC 5A-1	Great Falls	Helena S&G	Helena	Lewis and Clark	SE¼, SW¼: S23-T10N-R3W	8 bags	2/14/06	
CBC 5A-2	Missoula	G. Ruffato	Stevensville	Ravalli	W1/2, NE1/4: S23-T11N-R20W	6 bags	2/14/06	North of Stevensville Wye-Florence
CBC 5A-3	Kalispell	JTL-Hodson Pit	Kalispell	Flathead	W1/2, NE1/4 & SW1/4, NE1/4: S23-T30N-T21W	8 bags	3/15/06	Local commercial source
CTS 2A-1	Havre	Peterson Pit	Devon	Toole	SW¼, NW ¼: S23-T30N-R2E	8 bags	2/14/06	
CTS 2A-2	Glendive	Fisher S&G	Glendive	Dawson	SW¼: S34-T16N-R54E	8 bags	2/14/06	
CTS 2A-3	Missoula	JTL	Missoula	Missoula	E1/2, SE1/4: S6-T13N-R19W	6 bags	2/14/06	
CTS 2A-4	Lewistown	Brevig Land & Live	Lewistown	Fergus	NW¼, SW¼: S21-T16N-R17E	8 bags	3/15/06	Casino Creek Concrete
CTS 2A-5	Billings	JTL	Billings	Yellowstone	SE¼, S½: S15-T1S-R25E	8 bags	3/15/06	

*Note: One bag \cong 40 to 60 lb of material.

TABLE 2. Laboratory Testing Program Summary

Aggregate Type	Gradation	L.A. Abrasion	Modified Proctor	Direct Shear	Max/Min Voids	Permeability
(No. of tests to be performed)	(1)	(1)	(1)	(3)	(1)	(3)
CBC 6A-1	1	1	*	3	1	3
CBC 6A-2	1	1	*	3	1	3
CBC 6A-3	1	1	*	3	1	3
CBC 6A-4	1	1	1	3	1	3
CBC 6A-5	1	1	*	3	1	3
CBC 6A-6	1	1	*	3	1	3
CBC 5A-1	1	1	*	3	1	3
CBC 5A-2	1	1	*	3	1	3
CBC 5A-3	1	1	*	3	1	3
CTS 2A-1	1	1	1	3	1	3
CTS 2A-2	1	1	1	3	1	3
CTS 2A-3	1	1	1	3	1	3
CTS 2A-4	1	1	1	3	1	3
CTS 2A-5	1	1	1	3	1	3

Note: This table provides an accounting of the number of tests conducted to date. A “*” indicates the test has been removed from the testing program.

Summary of Expenditures

Table 3 summarizes the expenditures on this project through March 31, 2007. Total dollar expenditures for the project through March 31, 2007 were \$39,001.28, leaving \$3,666.72 for the remainder of the project.

TABLE 3. Budget Summary

Budget Category	Budgeted Funds	Spent Quarter 1, 2007	Total Remaining
Salaries	\$17,848.00	\$51.17	\$1,699.13
Benefits	\$4,628.00	\$15.57	\$1,346.22
In-State Travel	\$150.00	\$0.00	\$150.00
Out-of-State Travel	\$0.00	\$0.00	\$0.00
Expendable Supplies	\$200.00	\$25.76	(\$140.38)
Tuition	\$0.00	\$0.00	\$0.00
Subcontracts	\$0.00	\$0.00	\$0.00
MDT Direct Costs	\$22,826.00	\$92.50	\$3,054.97
Overhead	\$4,566.00	\$18.50	\$611.75
MDT Share	\$27,392.00	\$111.00	\$3,666.72
WTI/MSU Share	\$15,276.00	\$4,050.00	*(\$2,660.25)
Total	\$42,668.00	\$4,161.00	\$1,006.47

*Note: WTI/MSU has increased their match percentage to provide additional funds to the research assistant through a graduate fellowship.

Project Schedule Summary

An updated summary of the project schedule is shown in Figure 1. The proposed scope of laboratory testing is complete. We anticipate the final draft report will be completed and submitted to the Department on or before May 4, 2007. The remaining funds in the budget primarily will cover principal investigator labor for project oversight/management and final report preparation. In summary, the project is generally on schedule and the budget is on track with anticipated forecasts.

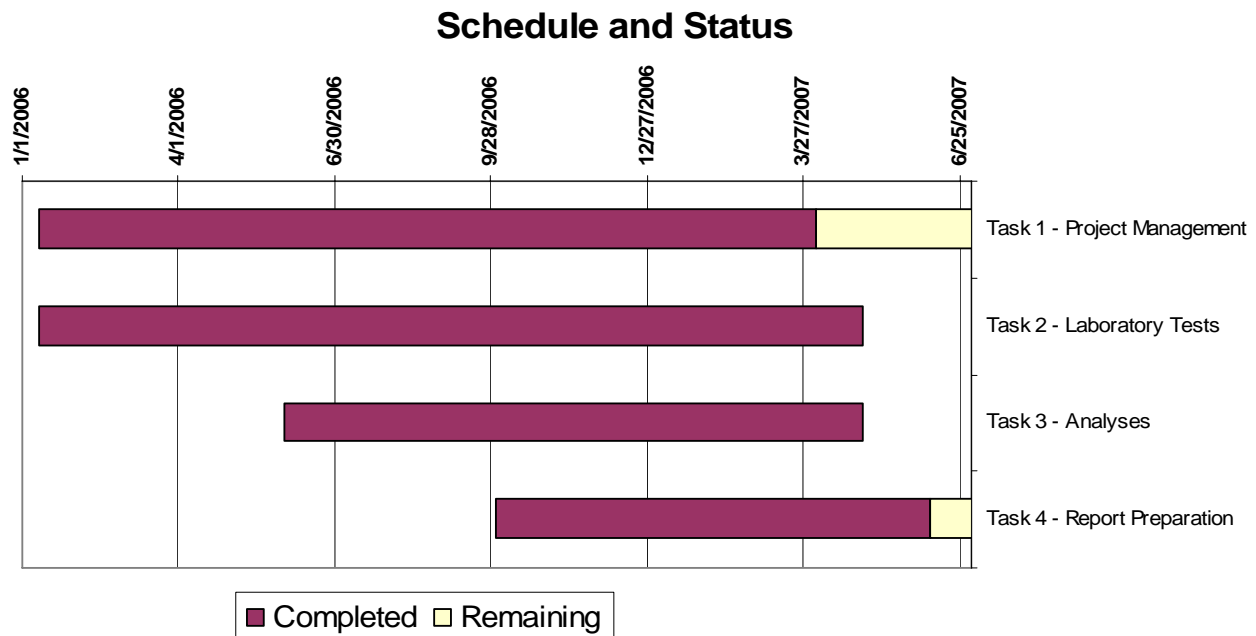


FIGURE 1. Project schedule summary.